

which is that artisans, clerks and others, for whom technical education is primarily provided, while wishing to learn, have in many cases left school so recently that they do not wish to return, and those of maturer age are not always quite certain whether their dignity will allow them to go to school again.

THE WOBURN EXPERIMENTAL FRUIT FARM.

THE fifth report on the Woburn Fruit Farm, by the Duke of Bedford and Mr. Spencer U. Pickering, F.R.S., contains a very useful summary of the results of ten years' experiments and observations on apple-trees. The conclusions arrived at are based on measurements of leaves, trees, and fruits, and also on weighings of the fruit. The average size of the leaf of the tree seems gradually to diminish with age, and there is a similar but less marked tendency in the fruit. The experiments indicate no advantage from heavy thinning of the fruit, for the size was not increased; hard pruning proved unprofitable, unpruned trees were three times more productive than those heavily pruned; summer pruning was found not to be desirable, and even moderate root pruning was found to injure the trees. Apple-trees transplanted at 2-3 years old were found to grow better than either younger or older plants.

A very curious result which for some time puzzled the experimenters was that carelessly planted trees, though weak at first, ultimately made more growth than those carefully planted. A satisfactory explanation has, however, been found. The roots of carelessly planted trees are so much injured that they make scarcely any growth; the result of this is that numerous new roots grow from dormant buds higher up the stem, and these new roots, not having suffered from transplantation, ultimately surpass in size the original roots of carefully planted trees.

The results obtained at the Woburn Fruit Farm are to some extent due to the particular soil—a moderately stiff clay—but it is probable that the conclusions arrived at would be found to hold good in many English orchards. It is, however, a very difficult thing to judge how far conclusions of the foregoing kind, based on a particular set of conditions, apply under different conditions, and the practical value of the long series of experiments and observations made at Woburn would be very greatly increased if similar experiments were conducted on a soil, or soils, of different character. In any action which the Board of Agriculture and Fisheries may take upon the report of the "Fruit" Committee, it is to be hoped that the important work of the Duke of Bedford and Mr. Pickering may be followed up and extended.

T. H. MIDDLETON.

NOTES.

To commemorate the meeting of the British Association in South Africa, a scheme has been formulated to found a British Association medal for South African students. This announcement was made by Prof. Darwin at the close of his presidential address at Johannesburg. A visit was paid to the Johannesburg Observatory on August 30, and the opportunity was taken of pointing out to Lord Selborne the suitability of the site for a fully-equipped observatory and the necessity for more astronomical work in the southern hemisphere. Referring to this suggestion in the course of his speech introducing Prof. Darwin as president of the association, Lord Selborne is reported by the *Times* correspondent to have said that "he greatly regretted he had been obliged to refuse the only request

that the association had made to him—namely, to find funds for the establishment of a proper observatory in Johannesburg. He was obliged to say that all the revenue they at present possessed was required for the development of their material resources and means of communication; but where the Government was powerless, what a magnificent opportunity there was for a patriotic Transvaal. For a site in the purest atmosphere, 2000 feet above the highest observatory now existing, only 10,000l. was required. There they might establish a telescope which would help observers in the southern hemisphere to compete with the astronomers of the northern hemisphere. The site was there, and it was already occupied by a perfectly equipped meteorological observatory." All the papers on South African matters read during the meeting are to be published in a separate volume by the South African Association for the Advancement of Science. At the closing meeting, held on September 1, Prof. Ray Lankester was elected president of the association for 1906.

MR. J. W. DOUGLAS, one of the editors of the *Entomologist's Monthly Magazine*, died at Harlesden on August 28 in his ninety-first year.

THREE distinct earthquake shocks, the severest ever experienced in the district, were felt at Portsmouth, New Hampshire, on August 30, beginning at 5.40 p.m.

REUTER'S correspondent at Stockholm reports that Prof. Nathorst has received a letter in which Lieut. Bergendahl, who is a member of the Duc d'Orléans's Greenland Expedition, states that on July 27, as the expedition passed Cape Bismarck, unknown land was discovered. It appears that Cape Bismarck lies on a large island, and not on the mainland. The new land has been mapped as well as possible, and has received the name *Terre de France*. The expedition was unable to penetrate further north than 78° 16' N. lat.

At the annual meeting of the Academy of the Lincei, which was held on June 4 in the presence of the King and Queen of Italy, the president, Prof. Blaserna, announced the result of the competition for the three Royal prizes founded by the late King Humbert. In the section of normal and pathological physiology, the prize is awarded to Prof. Aristide Stefani, of Padua, for his published work dealing with the physiology of the heart and circulation, the non-acoustic functions of the labyrinth of the ear, and the serotherapeutic treatment of pneumonia. In the sections of archaeology and of economic and social science, the judges reported that the competitors were not of sufficient merit to justify the award of the prizes. This is the first occasion on which so small a proportion of the prizes have been conferred, and it is proposed that in future the section of archaeology shall embrace not only classical, but also Christian and mediæval archaeology. Ministerial premiums intended to aid original work among teachers in secondary schools were awarded in the department of mathematical sciences to Prof. Ciani (50l.), Prof. Pirondini (38l.), and Prof. Chini (20l.). Out of the funds available from the Carpi prize, a sum of 32l. was awarded to Dr. P. Enriques for a thesis on the changes brought about in absorbed chlorophyll by the action of the liver, and the relation existing between the derivatives of chlorophyll produced in the organism and the genesis of the hæmatic pigments. In his address the vice-president, F. d'Ovidio, discussed in general terms the question "Art for Art's Sake," dealing more particularly with the influence exerted on national life and character by art and literature.

THE *Popular Science Monthly* (vol. lvii., No. 4) contains a suggestive article by Prof. John M. Coulter on the methods available for arousing public interest in scientific research. The results of scientific work usually reach the public through the medium of reporters to the newspapers and writers for the magazines; the material dealing with original research is, generally speaking, scant in amount, sensational in form, and wide of the mark. It is urged that men of science should, so far as possible, be their own interpreters, so that the misleading statements of the "middle man" may be avoided. Particularly, not only the facts of the investigation, but its general bearing should be made clear; it is this feature that the reporter always misses, and a "strategic movement is represented to the public as a dress parade." As a justification, it is contended that research will be shown to be practical, and a more ample endowment be secured for it. "The question of adequate support for research is the most serious one that confronts American science to-day." The appeal to American interest is utility, and it is necessary to show that practical results are reached most surely and most quickly from the vantage ground of pure science.

THE report of the commission appointed for the investigation of Mediterranean, or Malta, fever (part iii.), recently issued by the Royal Society, contains the important announcement that goats seem to be capable of transmitting the disease. The evidence supporting this conclusion is as follows:—On June 14 Dr. Zammit examined six goats, and found that the blood of five of them gave the agglutination reaction for Mediterranean fever. This was confirmed by Major Horrocks, R.A.M.C. Major Horrocks and Dr. Zammit then undertook the examination of eight different herds of goats, and in every herd examined an average of half the animals (from 7.6–75 per cent.) gave the agglutination reaction for Mediterranean fever. It was also found that one or more apparently healthy goats in every herd were excreting the specific organism of the disease—the *M. melitensis*—in their milk and urine, the number of the organism in the milk being very large. It would seem probable, therefore, that infected goat's milk may be the source of infection of man, particularly as monkeys may be artificially infected by feeding with material containing the specific organism, as has been detailed in a previous report. It is of interest that in Gibraltar, where the disease is also very prevalent, goats are almost the only source of the milk-supply.

THE report of the Government analyst of Trinidad for the year 1904–5 contains several points of general interest. Samples of water from the Carrera Convict Depôt have been examined to ascertain if a connection could be traced between the water supply and the prevalence of diarrhœa and dysentery among the prisoners. Very small proportions of lead, copper, and zinc were found to be present, and, in view of the fact that all attempts made during several years past to trace the epidemic to other causes have been unsuccessful, it appears possible that the metallic impurities named are responsible for the trouble. Before the question can be definitely decided, further investigation will be necessary. The aerated waters which are largely consumed in the colony were found to be usually contaminated with lead, owing to the use of an impure sulphuric acid in their manufacture, to an extent likely to prove dangerous. It is suggested that the use of liquefied carbon dioxide, such as is now imported into the colony in cylinders, would be a remedy for the difficulty.

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The adulteration of milk has very much decreased owing to the system adopted of suspending the licenses of sellers convicted of adulteration during the past year. Previously the Board of Health did not refuse the renewal of licenses, either temporarily or permanently, but only issued warnings.

THE fishes of Puget Sound form the subject of a paper by Messrs. Gilbert and Thompson in the *Proceedings of the U.S. Nat. Museum* (No. 1414). The paper is based on a collection made in 1903, which included two species regarded as new and six not previously recorded from the area in question.

THE opening article in the first part of the third volume of the quarterly issue of *Smithsonian Miscellaneous Contributions* is a translation of Dr. E. Mascha's valuable paper on the minute structure of the flight-feathers of birds, originally published in the *Zeitschrift für wissenschaftliche Zoologie*, and already noticed in our columns. Among the original communications, special reference may be made to one by Mr. F. W. True on the skull of an extinct sea-lion (Pontoleon) from the Miocene of Oregon, apparently the earliest known representative of this group of seals; to a second, by Mr. A. Mann, describing the extreme beauty of the surface sculpture in diatoms ("Diatoms, the Jewels of the Plant-World," it is called); and to a third, by Mr. C. A. White, on the ancestry of the North American pond-mussels of the family Unionidæ, in which it is concluded that all the living forms in this particular area are descended from fossil local types. It may be added that if we accept the views on nomenclature expressed in yet another article, the well known name *Dromæus* (for the emeu) has to give place to *Dromiceius*.

THE *Proceedings of the American Philosophical Society*, Philadelphia (xlix., No. 179), contains papers on the Filipino, on the Aborigines of Western Australia, on the osteology of sinopa, and on the marsupial fauna of the Santa Cruz beds. In an article on the oligodynamical action of copper foil on certain intestinal organisms, Mr. Kraemer concludes that intestinal bacteria such as the colon and typhoid bacilli are completely destroyed by placing clean copper foil in water containing them, and that certain of the lower animal and vegetable organisms possess a special sensitiveness to minute quantities of copper. The copper is probably in the form of a crystalloid rather than that of a colloid. It will be remembered that Dr. Moore, of the United States Department of Agriculture, has suggested the use of copper salts and of bright copper for the purification of water supplies. In another article Dr. Wiley discusses the effects of preservatives in food on metabolism, and expresses the opinion that boric acid and borates in any quantity upset digestion, and even in small doses, if given over a long period, have an unfavourable effect on health and digestion.

A PAPER by Dr. W. T. Calman, of the British Museum, on the Crustacea of the group Cumacea from the west coast of Ireland, published as No. 1, part iv., of *Scientific Investigations*, 1904, by the Irish Department of Agriculture and Technical Instruction, illustrates the importance of collecting on a thoroughly practical and effective system. During the entire cruise of H.M.S. *Challenger*, for instance, the whole collection of Cumacea was represented by no more than fifteen species, whereas Mr. E. Holt, the collector of the specimens submitted to Dr. Calman, obtained within a small area representatives of no less than forty-eight species, of which nine are regarded as new, one being so aberrant as to be assigned by its

describer to a separate family group. Most of the specimens were collected by means of tow-nets attached to the back of a trawl in such a position as to capture any creatures disturbed by the ground-rope.

IN the report on the sea and inland fisheries of Ireland for 1902 and 1903, part iii., scientific investigations, Mr. E. W. L. Holt, the scientific adviser of the fisheries branch of the Board of Agriculture and Technical Instruction for Ireland, takes a broad view of the services which scientific investigations can render to practical fishery problems. Not only are such subjects as oyster culture, the artificial propagation of the Salmonidæ, and the mackerel fisheries dealt with, but the various appendices to the report constitute a most valuable addition to our knowledge of the invertebrate marine fauna of Ireland, more especially of the very interesting and little-known fauna occurring in the deeper water off the west coast. The most important paper, from a scientific point of view, is that contributed by Mr. Holt himself, in collaboration with Mr. W. M. Tattersall, on the schizopodous crustacea of the north-east Atlantic slope, in which a great number of new or little known species are fully described and figured. Other papers deserving special notice are Mr. G. P. Farran's account of the copepoda of the Atlantic slope, and the interesting contributions of the Misses Delap on the rearing of *Cyanea lamarcki* and on the plankton of Valencia Harbour from 1899 to 1901. The whole report, which treats of both sea- and fresh-water fisheries, is well illustrated with a large number of plates and diagrams excellently reproduced, and reflects great credit upon the department responsible for the scientific study of the Irish fisheries.

THE *Pioneer Mail* of July 28 published an account of the phenomenal storm of wind and rain which devastated a large portion of the province of Gujarat between July 22 and 24, owing to which it was estimated that about 10,000 people were rendered homeless. The storm seems to have been most severe at Ahmedabad, 310 miles north of Bombay. The average annual rainfall of that place is only about 33 inches; during the storm in question it was stated that fully 37 inches were measured in two days. We find from the Official *Indian Daily Weather Report* that the fall was over-stated, but that nevertheless it was quite abnormal; 14 inches fell in twenty-four hours ending 8h. a.m. July 23, and 12½ inches on the following day. The Government meteorological reporter states that the fall was due to a severe cyclonic storm passing over the head of the peninsula, and to the fact that when it entered Gujarat it was fed by strong winds from the Arabian Sea.

WE have received "British Rainfall, 1904," being the forty-fourth annual volume of this very useful publication, containing the carefully prepared results of observations taken at nearly 4000 stations. Dr. Mill states that every return undergoes critical examination before the results are published, a task that must strain the energies of himself and his small available staff to the utmost. While every page of this now somewhat voluminous work contains information of the highest value in connection with the distribution of rain over the British Isles, it is difficult to fix upon any particular portion calling for especial remark. One new feature is the publication of complete daily records for ten selected stations, and, as last year, attention has been given to a discussion of some of the wettest days, illustrated by special charts. There are also several interesting articles dealing with various branches of rainfall work, e.g. an analysis of the observations on the

summit of Ben Nevis and at the base station at Fort William, for the years 1885-1903; for more complete details reference is made to an exhaustive discussion published by Mr. A. Watt in the *Journal of the Scottish Meteorological Society*. Another article deals with October rainfalls; this is generally the wettest month of the year over the greater part of England. In the present case, special reference is made to the comparatively dry Octobers of 1879, 1888, 1897, and 1904; with one exception, October, 1904, was the driest on record since the foundation of the British rainfall organisation. Another important article discusses the duration and average rate of rainfall in London since 1881. It shows *inter alia* that the rate of fall per hour is twice as great in July as in January.

WE are glad to be able to reproduce from the *Annuario* of the Messina Observatory for the year 1904 an illustration of that important Sicilian station, which, under the able superintendence of Prof. Rizzo, undertakes, in addition to the usual meteorological observations, valuable



FIG. 1.—The Messina Observatory.

researches connected with solar and terrestrial physics. The institution has risen from modest beginnings in 1876, when, at the instigation of Prof. Manzi, it was attached to the Technical and Nautical Institute of that city. The importance of its work was soon recognised by the Central Meteorological Office at Rome, which supplied it with several instruments. The present edifice on the hill of Andria was completed in 1902, under the auspices of the Royal University of Studies at Messina, and occupies a position much better suited to its useful work; it is now removed from all disturbing influences, and we look forward with confidence to important results connected with the relation of magnetism to solar activity and to the movements of the ground, to which subjects Prof. Rizzo devotes special attention.

THE International Council for the Exploration of the Sea continues to issue its publications in rapid succession. Of the Bulletins, which embody the records of the work more especially entrusted to it, we have received those for the terminal expeditions in November, 1904, and February, 1905 (Conseil Permanent International pour l'Exploration de la Mer, Bulletin, 1904-5, Nos. 2 and 3). We note, as additions to the routine observations of the council, an

extension of the surface observations made by merchant steamers on various routes, and a series of observations in February, 1905, made and communicated by the fishery branch of the Department of Agriculture and Technical Instruction for Ireland. It can serve no useful purpose to attempt the general discussion of the observations contained in these Bulletins as they appear; the general results can best be summarised at a later stage by the central authority, by whom the work will no doubt be undertaken. For the two dates concerned, a very marked feature of the observations in the English area is worth pointing out—the high salinity of the water at the entrance to the channel and to the west of Ireland. The origin of this salt water demands close investigation; it would seem to have come almost directly from the south, and in that event it is to be hoped that means of ascertaining whether Mediterranean water was present or not are available.

THE *Psychological Review* (article section) contains in its July number the following articles:—The synthetic factor in tactual space perception, T. H. Haines; consciousness and its object, F. Arnold; and a motor theory of rhythm and discrete succession (i.), R. H. Stetson. The first of these tabulates the results of certain preliminary experiments made by the writer in order to discover the exact relation between the two sorts of synthetic factor for local signs, viz. inner tactual sensations and the visual image. The main positions of the second article are these:—(1) Neither by introspection nor by any hypothesis of a consciousness aware of its own stream can we have any mental state in which consciousness does not have an object, and that object in the present; (2) the same holds for feeling and emotion; (3) the relation of thing to consciousness cannot be represented by any simple formulation like $\alpha R x$, but is in reality much more complex.

THE July number of *Mind* contains an excellent article by Mr. R. F. Alfred Hoernlé on Pragmatism *v.* Absolutism, which is mainly occupied with a discussion of Mr. Bradley's views. The writer finds fault with Mr. Bradley's use of the criterion of non-contradiction, his neglect of epistemology in favour of metaphysics, his doctrine of "degrees of truth and reality," and his theory that "a self-consistent reality must include the appearances, and yet cannot be its appearances." Dr. Norman Smith, in a second article on the naturalism of Hume, deals sympathetically with Hume's treatment of ethics. He claims that "Hume may, indeed, be regarded, even more truly than Kant, as the father of all those subsequent philosophies that are based on an opposition between thought and feeling, truth and validity, actuality and worth." Other articles deal with Empiricism and the Absolute, Plato's view of the soul, and Symbolic Reasoning.

THE *Journal of the Anthropological Institute* (July-December, 1904) contains the Huxley lecture for 1904, presented by Dr. Deniker, the subject being "Les Six Races composant la Population actuelle de l'Europe." This is virtually a re-statement and a vindication of the racial division which was propounded by Dr. Deniker eight years ago in "Les Races européennes" (*Bull. Soc. d'Anthr.*, Paris, iv., 3), which the researches of later years have served to illustrate and confirm. To the Nordic, Ibero-Insular, and Western or Cevenole races (corresponding to the Northern, Mediterranean, and Central or Alpine races of other authors) are added three main races:—Eastern, brachycephalic, short and fair; Littoral or Atlanto-Mediterranean, mesocephalic, tall and dark; and

Adriatic, brachycephalic, tall and dark. There are also four secondary races:—Sub-Nordic, brachycephalic, short and fair; Vistulan, brachycephalic, very short, fair or medium; North-Western, mesocephalic or brachycephalic, tall, medium or dark; and Sub-Adriatic, brachycephalic, and medium in stature and pigmentation. The maps of the average stature and pigmentation for Europe which accompany the paper are scarcely satisfactory. The cardinal principle laid down by Prof. Ripley, that the visual impression must, so far as possible, conform to the represented facts, has not been successfully followed, with the result that in the bewildering mass of detail no general impression can be gained by the eye without the assistance of the convention in the legend.

THE *Journal of the Franklin Institute* for August (clx., No. 2) contains papers of more or less interest, and covering most of the branches of science. Mr. Fuller discusses in a very complete manner the subject of sewage disposal and the pollution of shell-fish. A very full bibliography is appended to his paper.

WE have received from the Sytam Fittings Co., of Basinghall Buildings, Leeds, the catalogue of the company's system of filing, classifying, and indexing bottles, boxes, specimens, tubes, apparatus, &c. The company has applied the characteristics of the well known elastic or expansion series of bookcases to the purposes named, the specimen cabinets being built up of a number of interchangeable elements.

THE *Johns Hopkins Hospital Bulletin* for August (xvi., No. 173) contains an interesting account, by Dr. MacCallum, of the life and work of Marcello Malpighi, with full-plate portrait of this distinguished Italian anatomist of the seventeenth century. The concluding sentence of this article may be quoted:—"After all is considered the most enduring things in Malpighi's books are his perfect honesty, his extraordinary keenness and good sense in the interpretation of what he saw, and his ingenious objective methods of observation. What he saw could not have failed of being seen very soon by others, but we are filled with wonder that quite alone, with his 'quiet, eager mind,' he could have encompassed all, steadily searching out one thing after another throughout his forty years of restless activity."

WE have received the report of the second meeting of the South African Association for the Advancement of Science. It forms a handsome cloth-bound volume of 598 pages with 44 plates, and contains the forty-four papers read before the association printed in full. Summaries of the papers were published in *NATURE* (vol. lxx. p. 41) shortly after the meeting, and also the greater part of Mr. E. B. Sargent's address on the education of examiners (vol. lxx. p. 63). The presidential address by Sir Charles Metcalfe, and the sectional addresses by Mr. J. R. Williams on the metallurgy of the Rand, by Dr. G. S. Corstorphine on the history of stratigraphical investigation in South Africa, and by Sir Percy Girouard on improvements in rolling stock, are of permanent value, and the subjects and names of the authors of the papers make the volume an important addition to scientific literature, and show what a large amount of valuable scientific work is being done in South Africa. The illustrations are excellent. The coloured plates accompanying Dr. L. G. Irving's paper on miners' phthisis are admirably reproduced, as also are the photomicrographs of blue ground illustrating the paper by Mr. H. Kynaston and Mr. A. L. Hall on the geological features of the diamond

pipes of the Pretoria district. This paper is of special interest. In the Premier pipe a remarkable bar of purple quartzite, locally known as floating reef, occurs. It appears to be a mass of Waterberg sandstone that has dropped into the pipe. The blue ground is considered to be a serpentinised peridotite breccia with a specific gravity of 2.757. That of the Kimberley blue is 2.734.

OUR ASTRONOMICAL COLUMN.

DISCOVERY OF A NOVA.—A telegram from the Kiel Centralstelle, dated September 1, announces the discovery of a new star, by Mrs. Fleming at Harvard, on August 12. Its position, referred to the equinox of 1900, is given as follows:—

R.A. = $284^{\circ} 2' = 18\text{h. } 56\text{m.}$

Dec. = $-4^{\circ} 34'$,

and, although the magnitude is not mentioned, the Nova is said to be fading rapidly.

The position given above is near to that of λ Aquilæ, the Nova apparently forming the apex of an equilateral

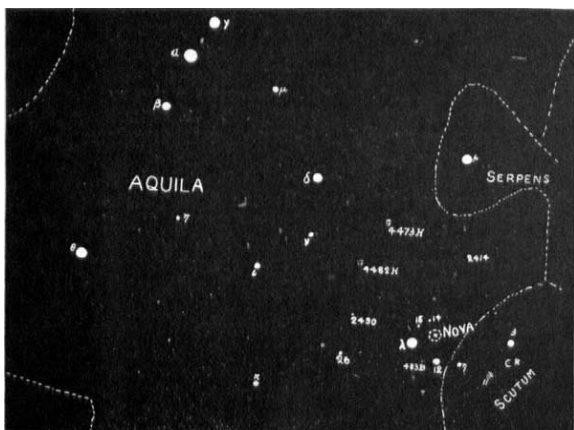


FIG. 1.—Chart of region about Nova discovered by Mrs. Fleming, August, 1905.

triangle which is completed by λ and ι Aquilæ. The accompanying chart of the surrounding region shows the approximate position of the object.

A later telegram from Prof. Pickering gives the value R.A. = $18\text{h. } 57\text{m. } 8\text{s.}$ as being more correct for the right ascension of this object.

WATER VAPOUR IN THE MARTIAN ATMOSPHERE.—In Bulletin No. 17 of the Lowell Observatory, Mr. Lowell describes a new spectroscopic method for testing the presence of water vapour in the atmosphere of Mars, and Mr. Slipher discusses the results obtained from an experimental trial of the method. The principles involved are as follows:—Cosmically considered, the earth's atmosphere is at rest as regards a terrestrial observer, whilst the Arcean atmosphere partakes of the planet's motion relative to the earth. This relative motion should be reflected in the solar spectrum, as obtained on a spectrogram of Mars, by a displacement of the lines due to the selective absorption common to both atmospheres. But in the terrestrial atmosphere water vapour accounts for a great deal of this absorption; therefore, if water vapour also exists in the Martian atmosphere the lines due to it should show a displacement, or at least a broadening, of such lines as those in the α band of the solar spectrum, or, with small dispersion, an extension on one side or the other of the band itself. The spectrum of the sunlight reflected by the moon, the approach or recession of which is negligible, is taken as the comparison spectrum, in which the earth's atmospheric absorption appears alone.

Mr. Slipher obtained several spectrograms of Mars and of the moon, the exposures being made when the respective bodies were at the same altitude. An examination of the α band and of the water vapour lines near D in

both spectra seemed to indicate a slight shift, but the measurements made were uncertain and discordant, and no definite conclusion could be arrived at. So far as selective absorption is concerned, the spectrum of Mars seems to be the same as that of the equally high moon. Similar experiments on the planet Venus, using direct sunlight for the comparison spectrum, were equally inconclusive.

REAL PATHS OF LYRID METEORS.—The real paths of forty April meteors, recorded during the period 1889–1903 by different observers, are given by Mr. Denning in the *Observatory* (August). Many of the objects observed were Lyrids, and Mr. Denning emphasises the importance of this shower and its contemporaries, and, further, gives a daily ephemeris for the Lyrid radiant, based on his own observations of 703 meteors (186 Lyrids) during the years 1873–1904. This ephemeris covers the period April 15–April 25, but its author is doubtful of the radiant's activity on April 15, 16, and 25. On April 15 the computed position is $\alpha = 263\frac{1}{2}^{\circ}$, $\delta = 33^{\circ}$, and the latter value is constant. The right ascension, however, increases at the uniform rate of one and a quarter degrees per day.

OBSERVATIONS OF SATELLITES.—In No. 4035 of the *Astronomische Nachrichten* Dr. C. W. Wirtz publishes the results of a series of observations of various satellites made with the 49 cm. (about 19½-inch) refractor of the Strassburg Observatory during 1902, 1903, 1904, and 1905. The results are given in a tabulated form, showing the differences between the calculated and observed position angles and distances. Dealing with Neptune's satellite, Dr. Wirtz found that it exhibits a marked variation of apparent brightness according to its position in its orbit. In longitude 40° (or position angle 60°) it is brightest, in longitude 240° (i.e. position angle 180°) it is least bright. Saturn's satellites, iii.–viii. inclusive, are also dealt with, the positions with regard to the planet and then to each other being given.

THE BRITISH ASSOCIATION.

SECTION G.

ENGINEERING.

OPENING ADDRESS BY COLONEL SIR C. SCOTT MONCRIEFF, K.C.S.I., K.C.M.G., R.E., LL.D., PRESIDENT OF THE SECTION.

SCIENCE has been defined as the medium through which the knowledge of the few can be rendered available to the many; and among the first to avail himself of this knowledge is the engineer. He has created a young science, the offspring, as it were, of the older sciences, for without them engineering could have no existence.

The astronomer, gazing through long ages at the heavens and laying down the courses of the stars, has taught the engineer where to find his place on the earth's surface.

The geologist has taught him where he may find the stones and the minerals which he requires, where he may count on firm rock beneath the soil to build on, where he may be certain he will find none.

The chemist has taught him of the subtle gases and fluids which fill all space, and has shown him how they may be transformed and transfused for his purposes.

The botanist has taught him the properties of all trees and plants, "from the cedar tree that is in Lebanon even unto the hyssop that springeth out of the wall."

And all this knowledge would be as nothing to the engineer had he not reaped the fruits of that most severe of all pure and noble sciences—the science of numbers and dimensions, of lines and curves and spaces, of surfaces and solids—the science of mathematics.

Were I to attempt in the course of a single address to touch on all the many branches of engineering, I could do no more than repeat a number of platitudes, which you know at least as well as I do. I think, then, that it will be better to select one branch, a branch on which comparatively little has been written, which has, I understand, a special interest for South Africa, and which has occupied the best years of my life in India, Southern Europe, Central Asia, and Egypt—I mean the science of irrigation. My